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CHAPTER 3

of a series on

STRUCTURAL SLATE

STAIRWAYS

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THE STRUCTURAL SLATE COMPANY

PEN ARGYL, PENNSYLVANIA

Representing the majority of the Producers in the
PENNSYLVANIA SLATE DISTRICT

Compiled by the **Structural Service Bureau** Co-operating with
the Producers and D. KNICKERBACKER BOYD, Architectural Adviser
and Structural Standardist

This Publication, bearing date of January 1st, 1921, is of the Standard 8½ x 11 size recommended by the American Institute of Architects, and is intended for the Files of Architects, Engineers and Constructors

PREFACE

In the Northampton and Lehigh County districts of Pennsylvania are veins of slate, the abundant supply and noteworthy characteristics of which make it extremely desirable for architectural and structural uses. For the purpose of co-ordinating developments in the slate industry and affording combined production, milling and delivering facilities, the majority of the producers of slate in the region organized as The Structural Slate Company.

Through such an organization it has been made possible to conduct a comprehensive survey of the field covered by structural slate in its various uses. This has resulted in the obtaining of much valuable data and in the development of conservation, standardization and efficiency measures, almost impossible of accomplishment without such concerted action.

It is the desire of The Structural Slate Company to place all of the material which it has thus been able to gather at the disposal of all users of structural slate. It is therefore disseminating this information in the form of Chapters, each one of which is devoted to a separate use of structural slate, save the first two, which are general in character and a subsequent chapter which will show fittings applicable to all.

This Chapter 3, concerning Stairways, is the third one issued, the two preceding Chapters relating to subjects as follows:---

Chapter 1---Origin and Geologic Data. Commercial Gradings and Standard Finishes.

Chapter 2---Basic Specification. Essential Information and Preparatory Work.

Additional Chapters will be issued from time to time as the necessary data is assembled and the standards developed.

In the desire to assist in the most appropriate use of slate and to standardize as much as possible the practice with respect to the arrangement and thicknesses and details of treads and risers, the drawings illustrated on pages Nos. 6 and 7 have been worked out to afford the proper setting of slate without limiting the supporting members or materials to any particular style, type or size. The use of handrails and their design and support, the use of slate for strings, as well as other features of stairways, their enclosures, etc., are all left for the individual to select and detail as he may see fit.

When the type of stairs has been decided upon, together with rails, balusters, strings and supports, these can be especially designed to receive the slate treads and risers of other members, or they may be specified as to structural requirements and referred to as to be in accordance with the specifications and detailed drawings contained in this Chapter with respect to thickness, construction, etc.

CHAPTER THREE

of a series on

STRUCTURAL SLATE

STAIRWAYS

CHARACTERISTICS OF SLATE

Due to certain properties inherent in Slate, the use of this product of nature as a structural material for stairs in buildings requiring resistance to fire and wear has increased to a very great extent during recent years. Slate is non-combustible, sanitary, and requires no paint or other upkeep. It is dustless, always serviceable, easily cleaned, and may readily be used in combination with other materials. Furthermore, slate treads and landings are, to the fullest extent possible in any natural material, anti-slip and wear-proof.

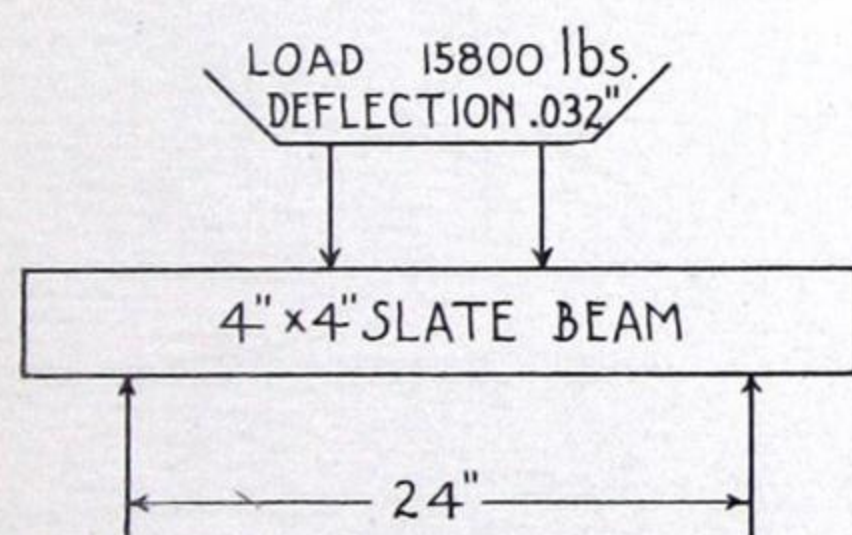
Compactness and Fissility

Slate is classified as "Roofing Slate" and "Mill Stock" or "Structural Slate." The latter, from which all stair work is made, requires a finer, more evenly grained and more compact material than roofing slate and a material with a smooth cleavage surface.

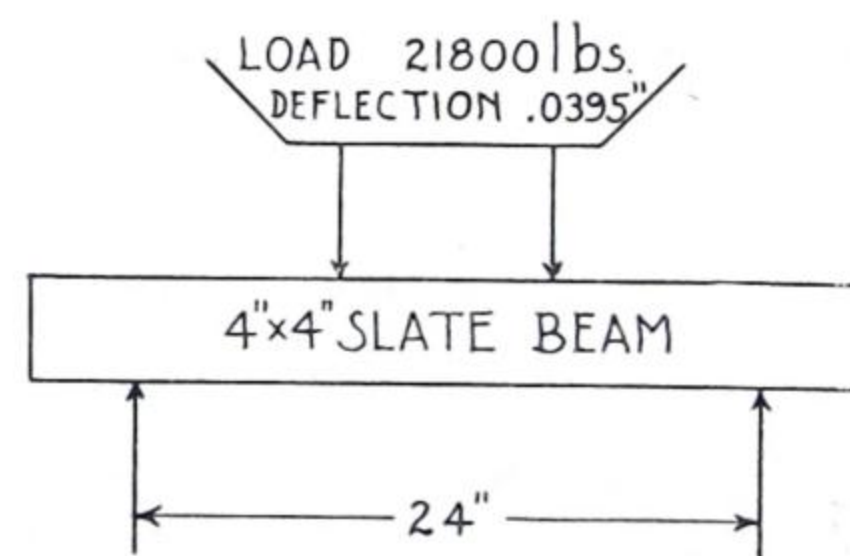
This latter characteristic, technically known as fissility, permits even the largest sized slabs to be readily split into any desired thickness and contributes additionally to the tensile strength.

Tensile Strength

Because of its great tensile strength slate can be used with a minimum of structural members, requiring but comparatively light metal for supporting treads and landings in the construction of stairs. Slate also possesses a remarkable degree of toughness and elasticity which is manifested by its resistance to strain, shock, blows and the effects of settlement.



Tests by A. S. Merrill, of Lafayette College, show that a slate beam 4" square and 30" long, with a clear span of 24" and loaded to 15,800 pounds, with cleavage planes horizontal, will deflect .032 of an inch, increasing to .0395 for a total load of 21,800 pounds.



Quality and Grades

Structural Slate is produced in but one quality, of which there are two gradings, known as Ribbon Stock and Clear Stock, as more fully described in Chapters 1 and 2.

The ribbons in structural slate have been completely metamorphosed and, in the splitting process, cleave with the grain of the slate, their tenacity in this respect being another of the remarkable attributes of this age-long product of nature. As in similar natural phenomena, forcible breaking of the structure will disrupt slate quite irrespective of the location of the ribbons and not at them.

Tests at random produce the same results for strength as between the commercially marketed ribbon and clear stocks. This is shown in tabulated records, and, as the ribbons offer no less resistance to wear than the clear portions and as the production and special selection of only clear stock is against true conservation and increases the expense to a very considerable degree, the material for stairs is, therefore, marketed in ribbon stock only unless otherwise distinctly specified.

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

Production and Finishes

Information relating to extraction and milling is contained in Chapter 1, which also describes and illustrates in detail the various surfaces and finishes, including the standard sand-rubbed finish, which is almost invariably given to the faces of stairway slate.

Non-Absorption and Abrasion

The results of tests which show that slate, considered either in its raw or finished state, is one of the least absorptive of any of nature's products, are tabulated in Chapter 1, and, with other data and illustrations, are also publicly registered in Sweet's Architectural Catalogue, 15th Edition, Pages 226 to 232. This quality of impermeability combined with the velvet-like grip on its grained surface is what makes slate such an ideal material for stair treads and landings and other surfaces subjected to the abrasive action of persons walking. Interesting statistics are available of the long life of slate under the action of millions of feet and at the end of this chapter is published a brief list of some of the buildings in which slate has been installed subject to such wear.

STANDARDIZATION AND SERVICE

The slate producers in the organization known as The Structural Slate Company comprise the operators of approximately eighty-five per cent. of the mills in the Pennsylvania Slate district. With this complete modern equipment and manufacturing processes which are being developed on lines of standardization now in formation, it will become increasingly possible, with the co-operation of architects and constructionists, to keep on hand large stocks of slate of sizes and shapes which are interchangeable for various structural uses.

Such procedure will not only afford practically continuous employment to quarrymen and millworkers, but will as nearly as it is possible to do so, obviate all delays of shipment whenever material and equipment can be specified, detailed and ordered from the standards described and shown in the various Chapters.

This fact, however, is not to be construed as placing limitations upon the size or type of slate fixtures and equipment, which can be produced on short notice to meet all space requirements or other variable conditions.

The Structural Slate Company maintains at its headquarters at Pen Argyl a large and efficiently trained force of specialists in Slate and its installation whose services are at the disposal of Architects, Contractors and Owners in the solving of any problem relating to the use of Structural Slate.

Basic Specifications For Structural Slate Work

In Chapter 2 of this Series is a Basic Specification for Structural Slate Work---(pages 6 to 10 inclusive.) That specification includes stairways in general and various other features in a complete slate installation. That Chapter also includes Essential Information---(pages 3, 4 and 5), and notes with respect to Preparatory Work---(pages 11 and 12) acquaintance with which is desirable in the writing of general slate specifications. For the structural slate of stairways, however, the following specification is offered, which differs in no essential respect from the portions on stairs included in Chapter 2.

All of the structural and finishing members, other than the slate itself, are, of course, assumed to have been elsewhere specified as to be furnished by other contractors and left ready for the installation of the slate by the contractor for "Structural Slate."

Whenever dotted lines or words within parenthesis occur in the specification, they are intended to indicate alternates, additions, or suggestions for consideration, and should be filled in, altered or eliminated to suit any particular instances.

Notes are introduced as to paragraphs which should be considered for insertion under the various trades concerned with other branches of building construction.

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

SPECIFICATION SLATE STAIRWAYS

GENERAL CONDITIONS:

- (1) The General Conditions, Paragraphs 1 to 14 inclusive, as printed in Chapter 2 on Structural Slate, copyrighted by and registered with the Structural Service Bureau of Philadelphia, bearing date of April 15th, 1920, are hereby made to constitute the General Conditions of this Specification.
- (2) *NOTE:* Each portion of the slate work for stairs is separately mentioned in the following specification, in order that the portions not applicable in any particular instance need only be eliminated.
- (3) **MATERIALS AND WORK INCLUDED:** Furnish and install complete on the (metal, concrete, or other) structural supports supplied by other Contractors, the slate work in connection with all steps or stairways indicated on the drawings and in accordance with this specification.
- (4) **FINISH:** All pieces of slate to be standard sand-rubbed on the face and have planed surfaces on the reverse side. Any exposed reverse surfaces to be oiled and all sand-rubbed faces to be left clean without oil.
- (5) **TREADS AND LANDINGS:** To be of slate, $1\frac{1}{4}$ " thick, with slightly rounded edges to nosings, with a total projection of $\frac{3}{4}$ " beyond face of riser. Treads to be set to incline $\frac{1}{8}$ " from back to front. (and landings to be set level).
- (6) *NOTE:* For stairs in hotels, theatres, subways, etc., where traffic is heavy and for widths of over 3' 6" treads and landings should be from $1\frac{1}{2}$ " to 2" thick,---risers 1".
- (7) **RISERS:** To be of slate 1" thick, butt-jointed, with full packing and not less than two $\frac{1}{4}$ " x $1\frac{1}{4}$ " brass dowels at each joint, to the backs of treads below and to the under front edge above.
- (8) *NOTES:* Where metal risers for stairs are used if the same, whether cast or pressed, are specified or detailed to be angled or lipped near bottom for slate tread to slip under, (See Page 6, Detail 1) the dowels are not necessarily required on top flange. In some instances specifications call for two or more lugs, or spuds to be cast on the top of risers, in which case the under sides of slate treads are countersunk to fit over same.
- (9) The metal channels will form strings for stairs, but if metal is not continued around landings, slate bases should be specified and brought out enough from face of wall to receive the open ends of the channels.

SETTING:

(For slate work between or upon iron supports)

- (10) All slate work is to be thoroughly dampened just before laying and each tread is to be thoroughly bedded in slater's cement on all (slate or metal) risers or supporting angles or metal work, (and for open stairs this jointing to be neatly cut back or pointed from the underneath as work progresses). All joints between slate and slate, or slate and metal, including those at ends, to be packed with same cement and pointed tight.

(For reinforced concrete supports)

- (11) All slate work is to be thoroughly dampened just before laying and to be bedded in or backed with cement mortar, composed of Portland cement and two volumes of well-graded, clean sand. All joints between slate and slate and between slate and cement are to be packed with slater's cement and pointed flush.
- (12) *NOTE:* If risers are of cement (See Page 2, Detail 3) the same should be troweled on in connection with the concrete work, if not, as in some cases, poured with panelled or recessed faces.

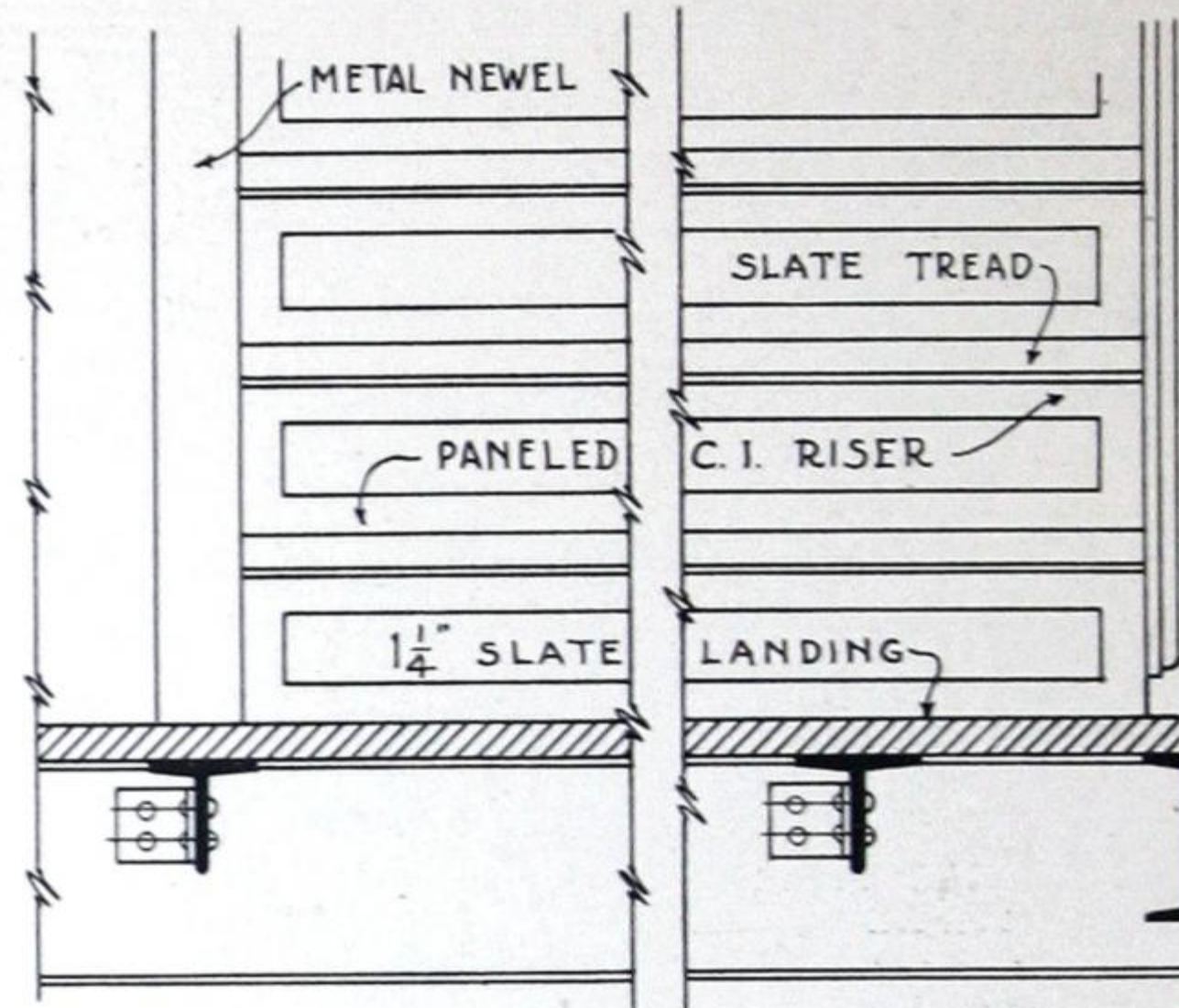
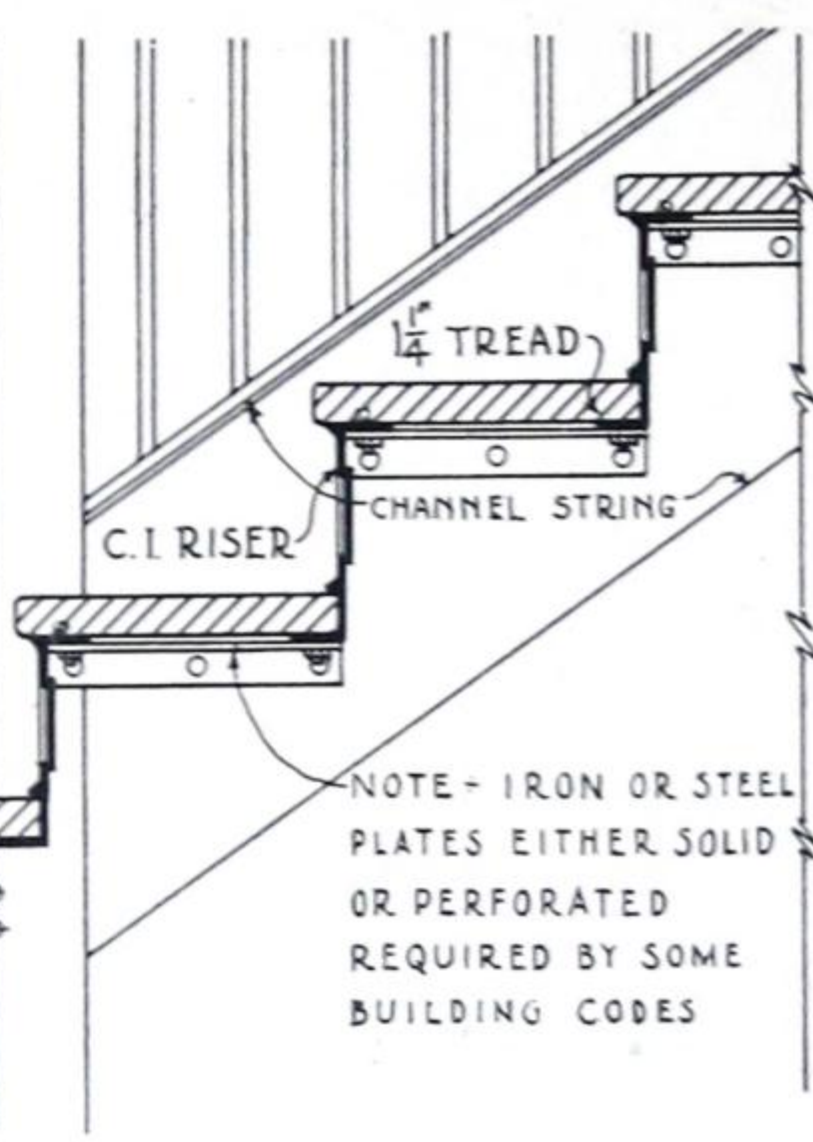
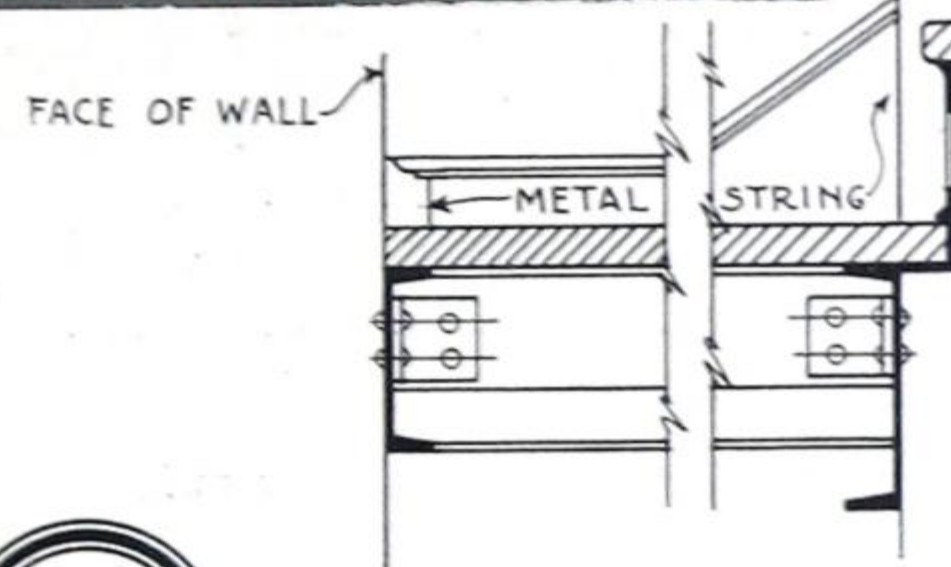
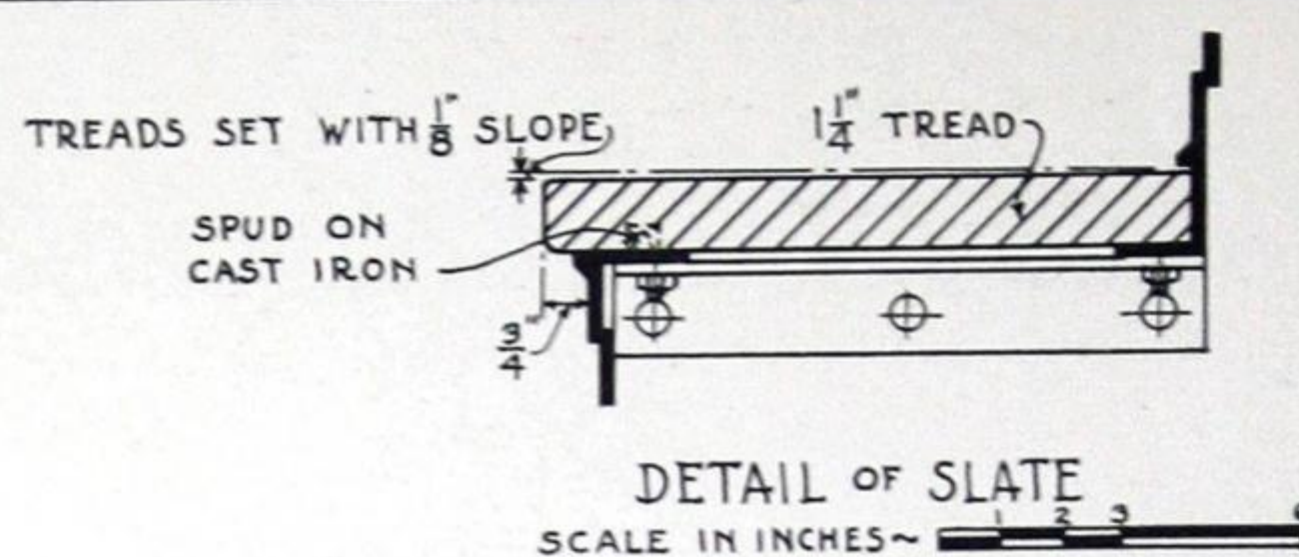
STRINGERS AND BASES:

- (13) To be of slate 1" (or more) thick by high, measured at right angles from edge of nosing (and the same height from level floor where strings are continued around landings at floor levels or between same.) All strings (or bases) to be rounded (or moulded) at top with returns cut on the solid at any openings, (and, where moulded, cut with solid returns on all interior and exterior angles.)

FOR FLOORS, BASES, PLINTHS, THRESHOLDS AND WAINSCOTING:

- (14) See Basic Specification in Chapter 2, pages 9 and 10.

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE



1

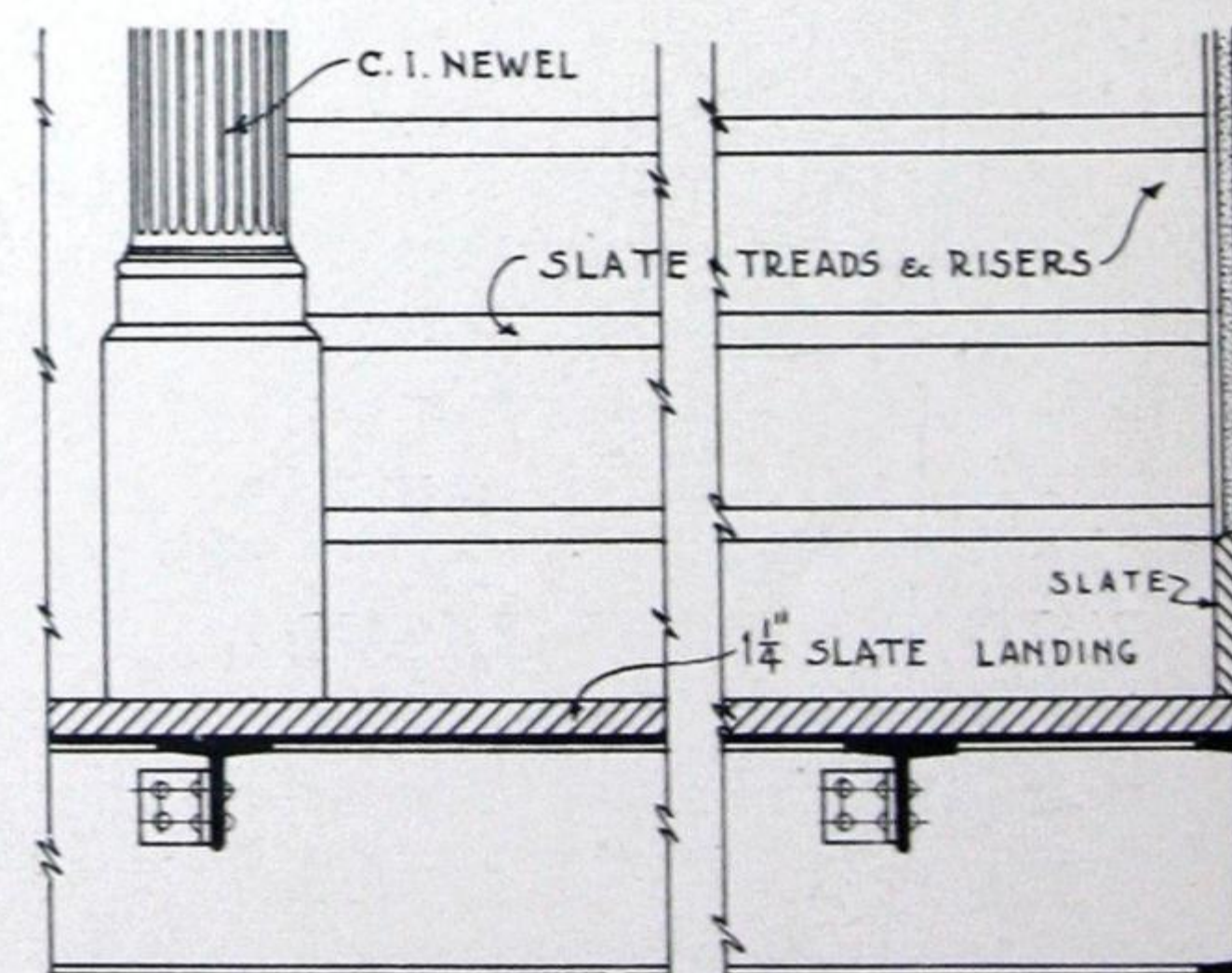
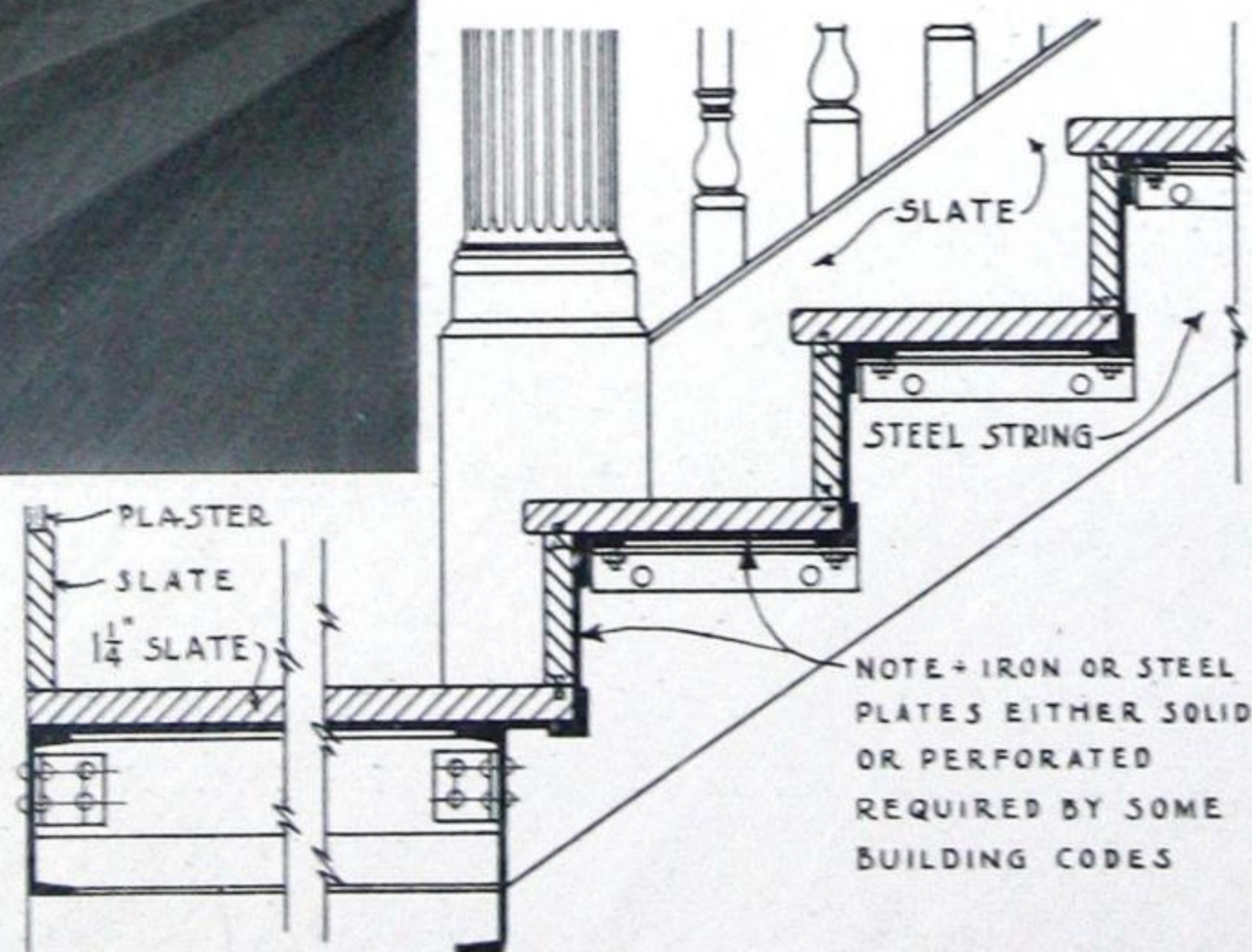
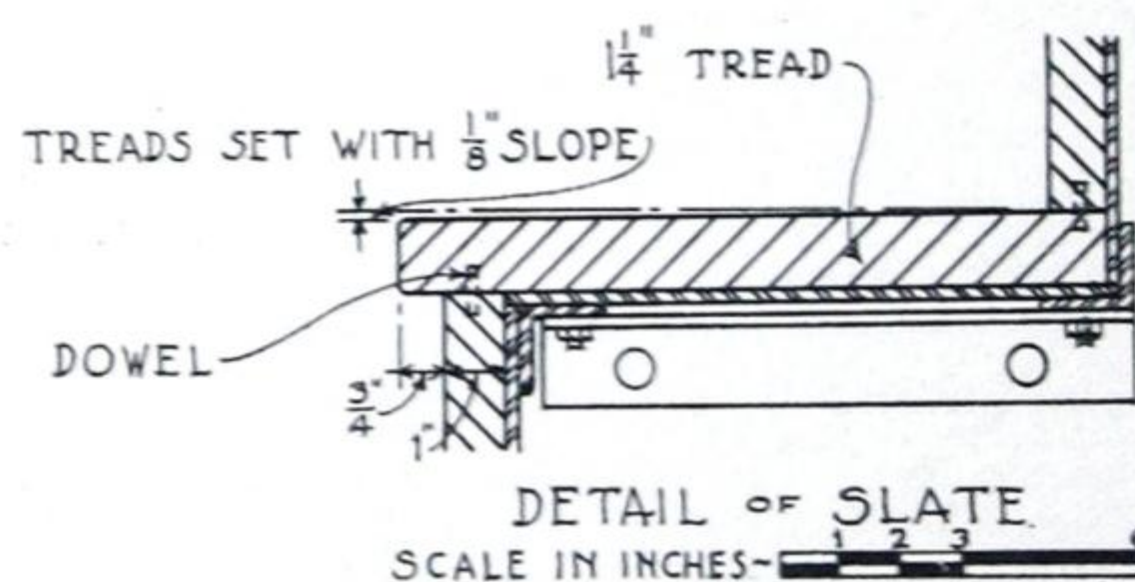
SECTION

SCALE IN INCHES ~ 1 2 3 6

ELEVATION

SLATE TREADS-CAST IRON RISERS-STEEL SUPPORTS

TYPICAL DETAIL OF A STAIRWAY SIMILAR TO ILLUSTRATION



2

SECTION

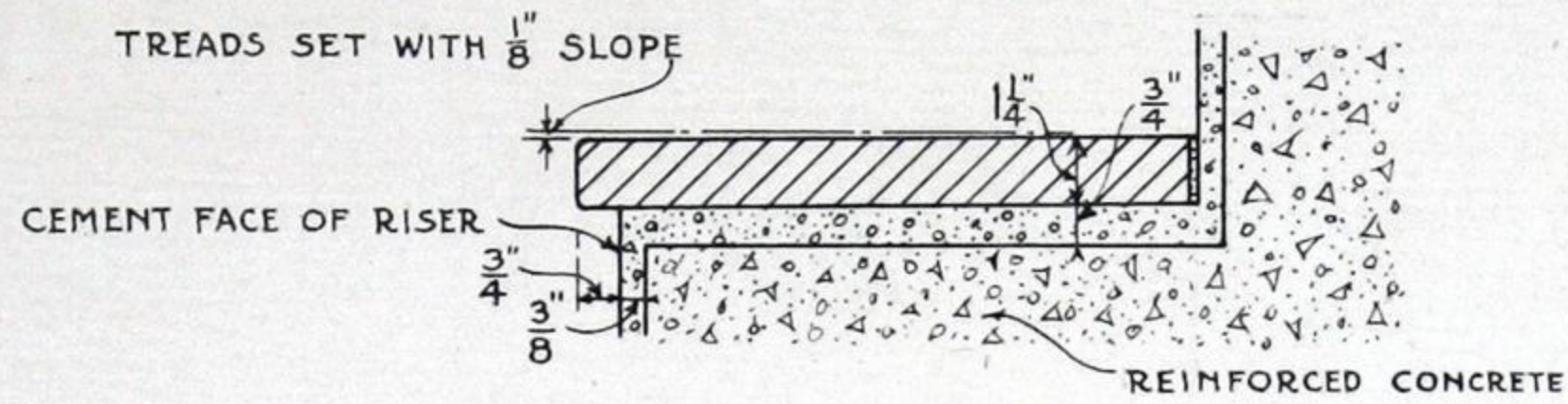
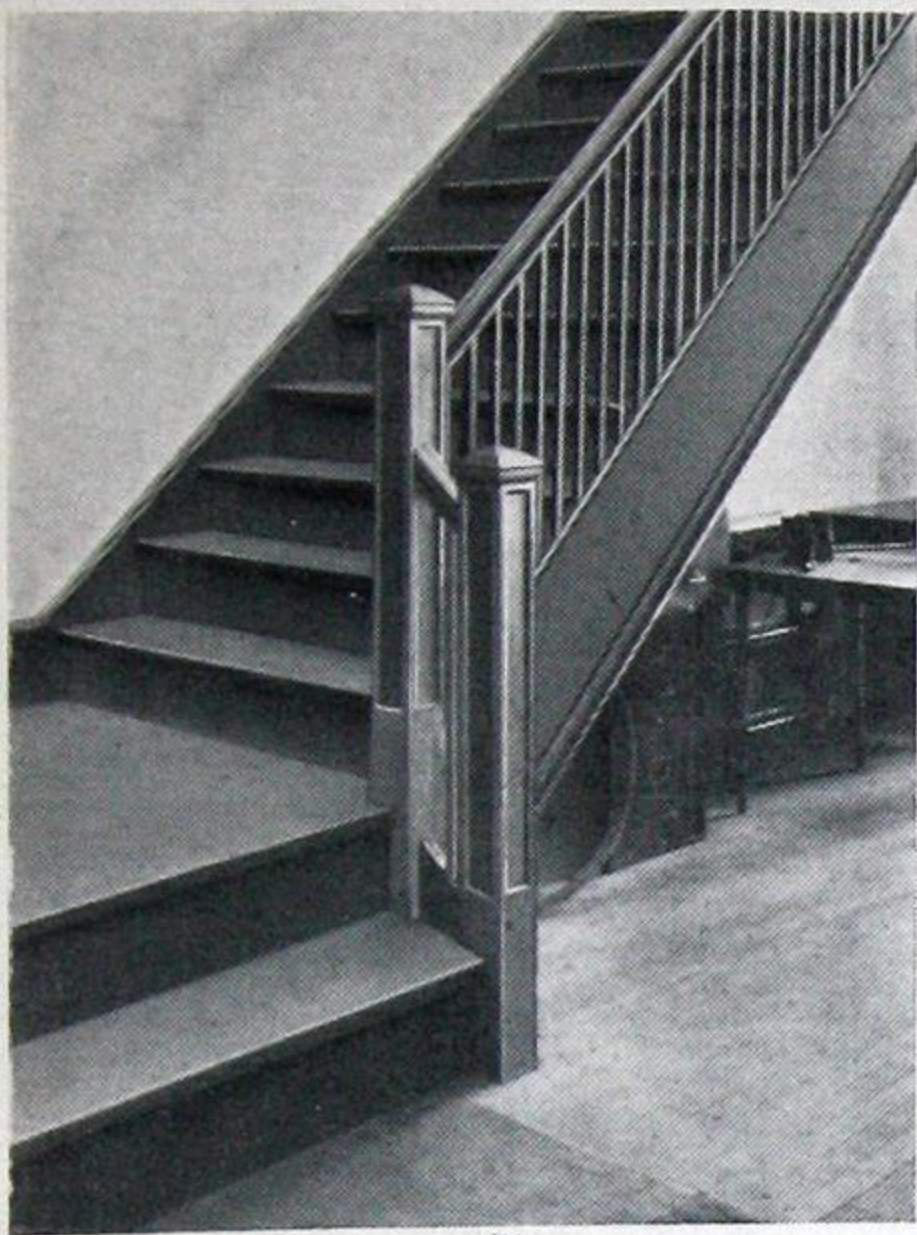
SCALE IN INCHES ~ 1 2 3 6

ELEVATION

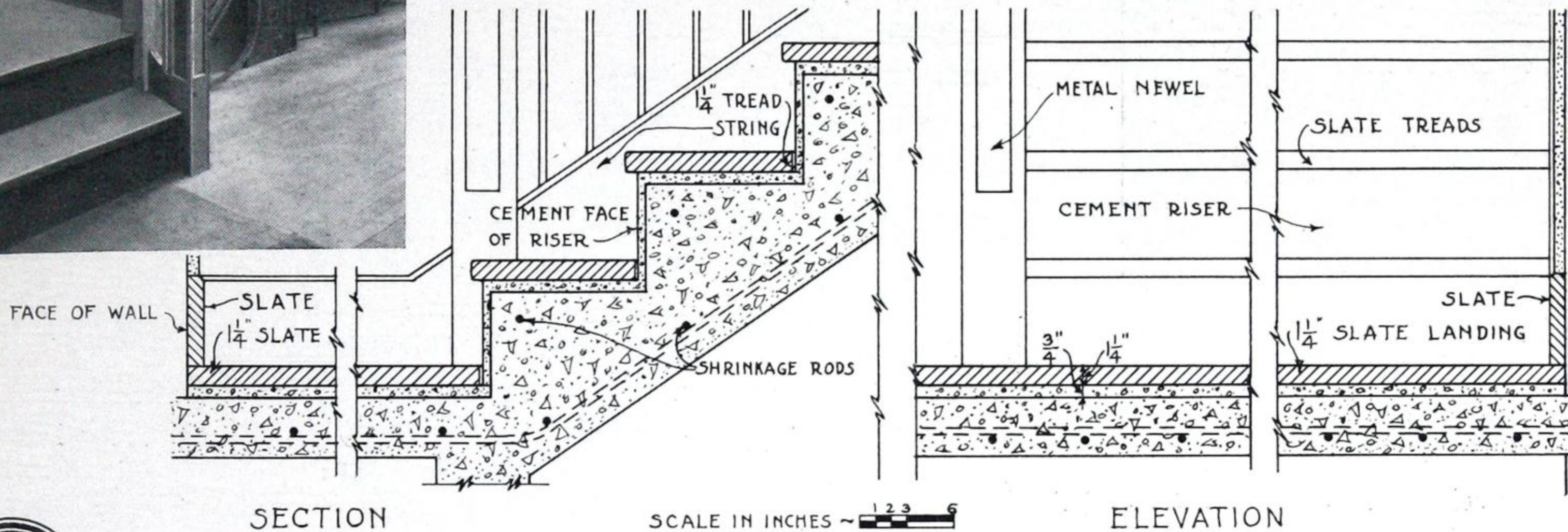
SLATE TREADS AND RISERS-STEEL SUPPORTS

TYPICAL DETAIL OF A STAIRWAY SIMILAR TO ILLUSTRATION

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

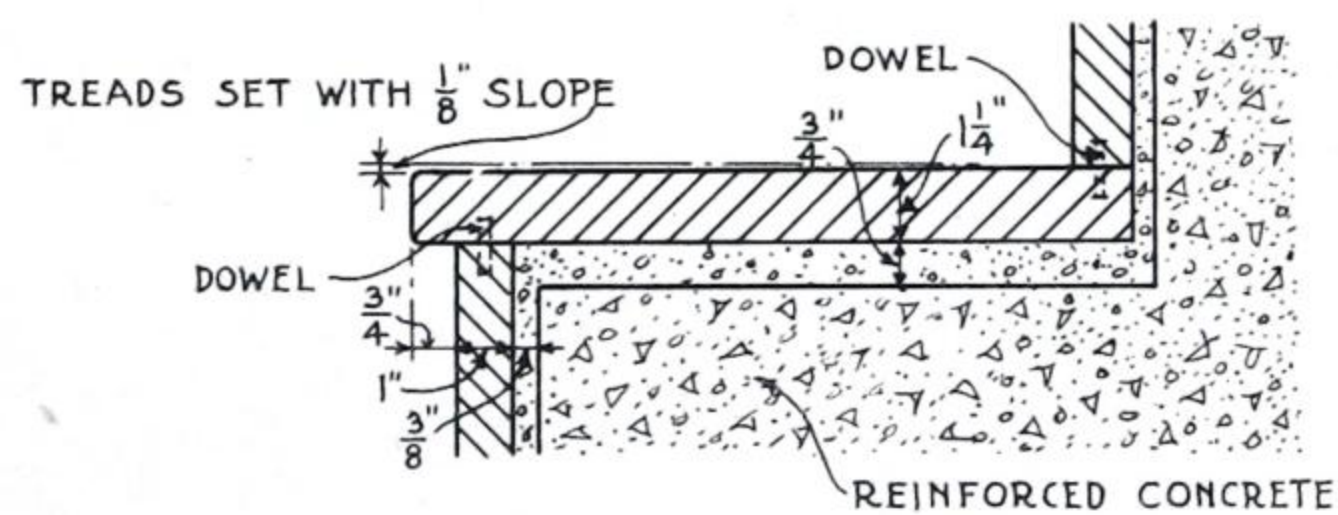


DETAIL OF SLATE
SCALE IN INCHES ~ 1 2 3 6

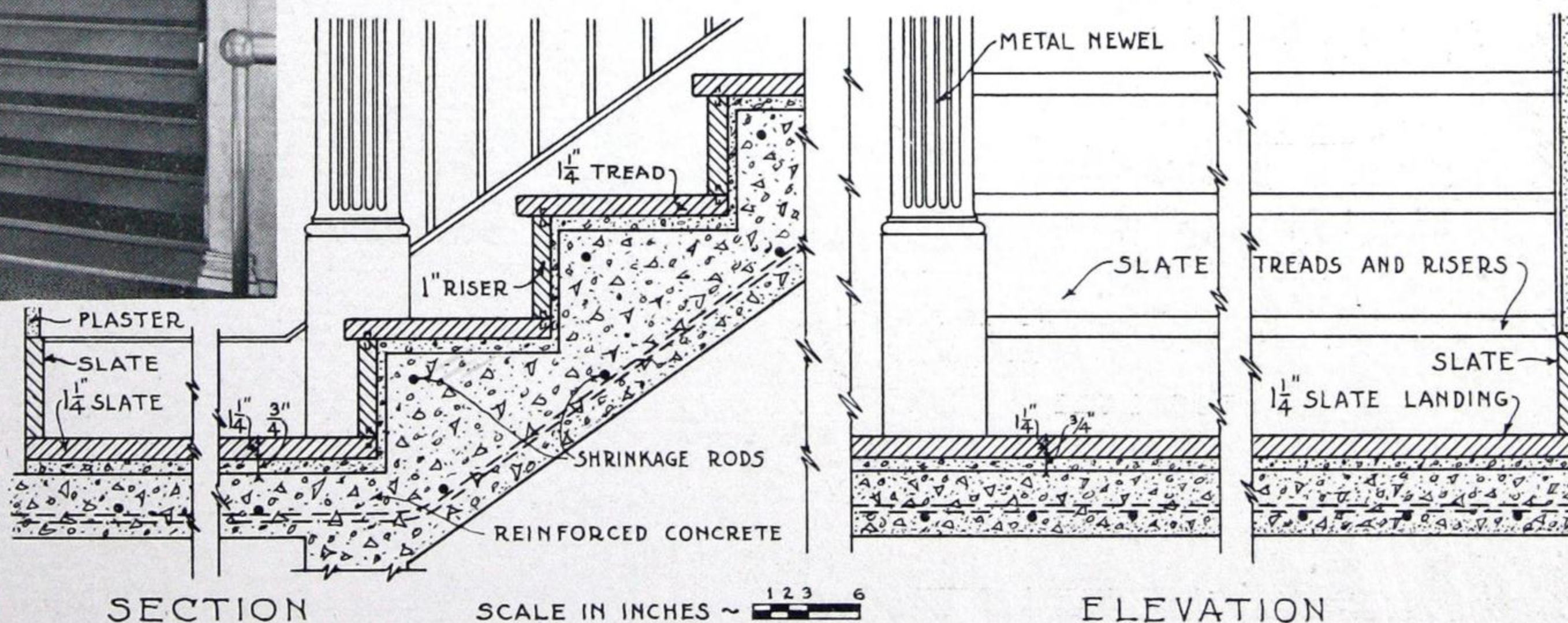


3

SLATE TREADS-CEMENT RISERS-REINFORCED CONCRETE
TYPICAL DETAIL OF A STAIRWAY SIMILAR TO ILLUSTRATION



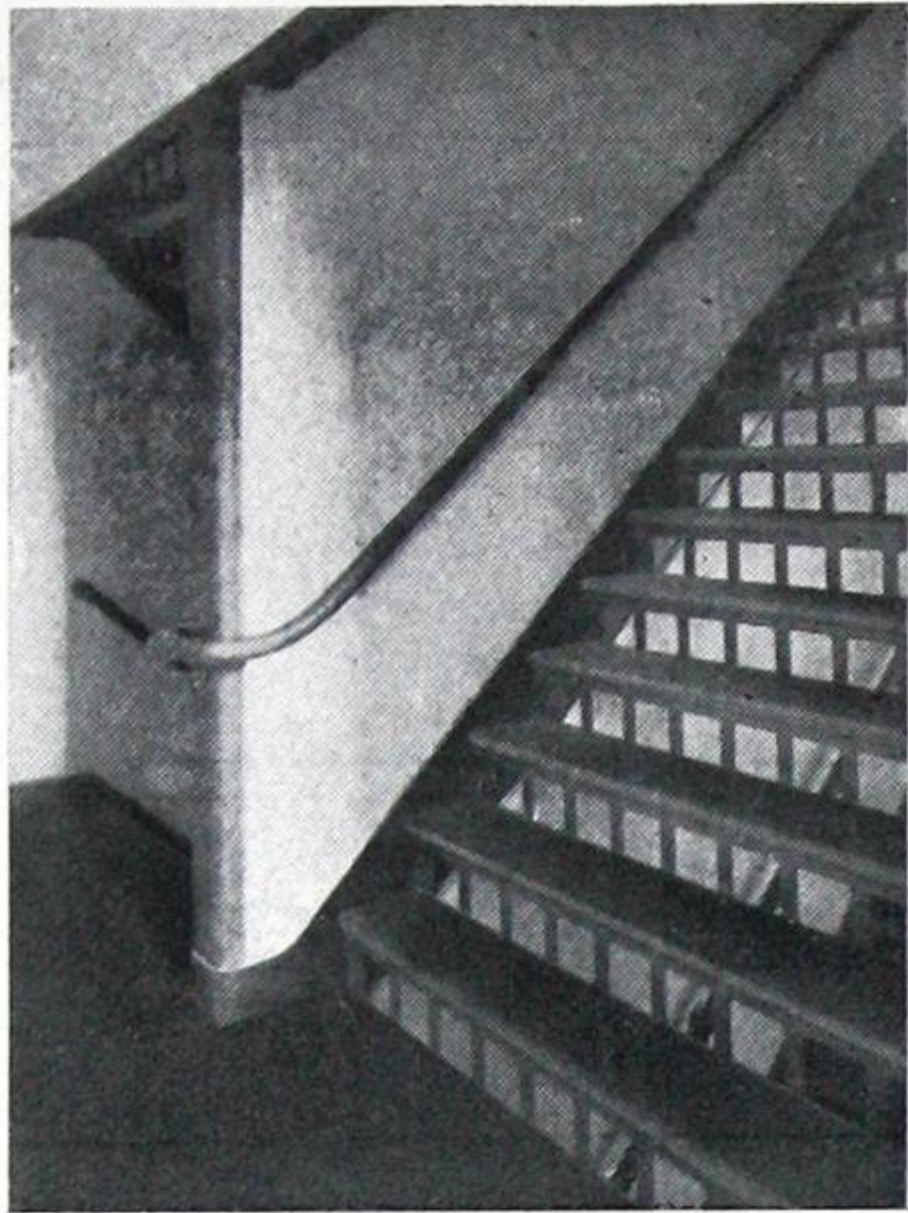
DETAIL OF SLATE
SCALE IN INCHES ~ 1 2 3 6



4

SLATE TREADS AND RISERS-REINFORCED CONCRETE
TYPICAL DETAIL OF A STAIRWAY SIMILAR TO ILLUSTRATION

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

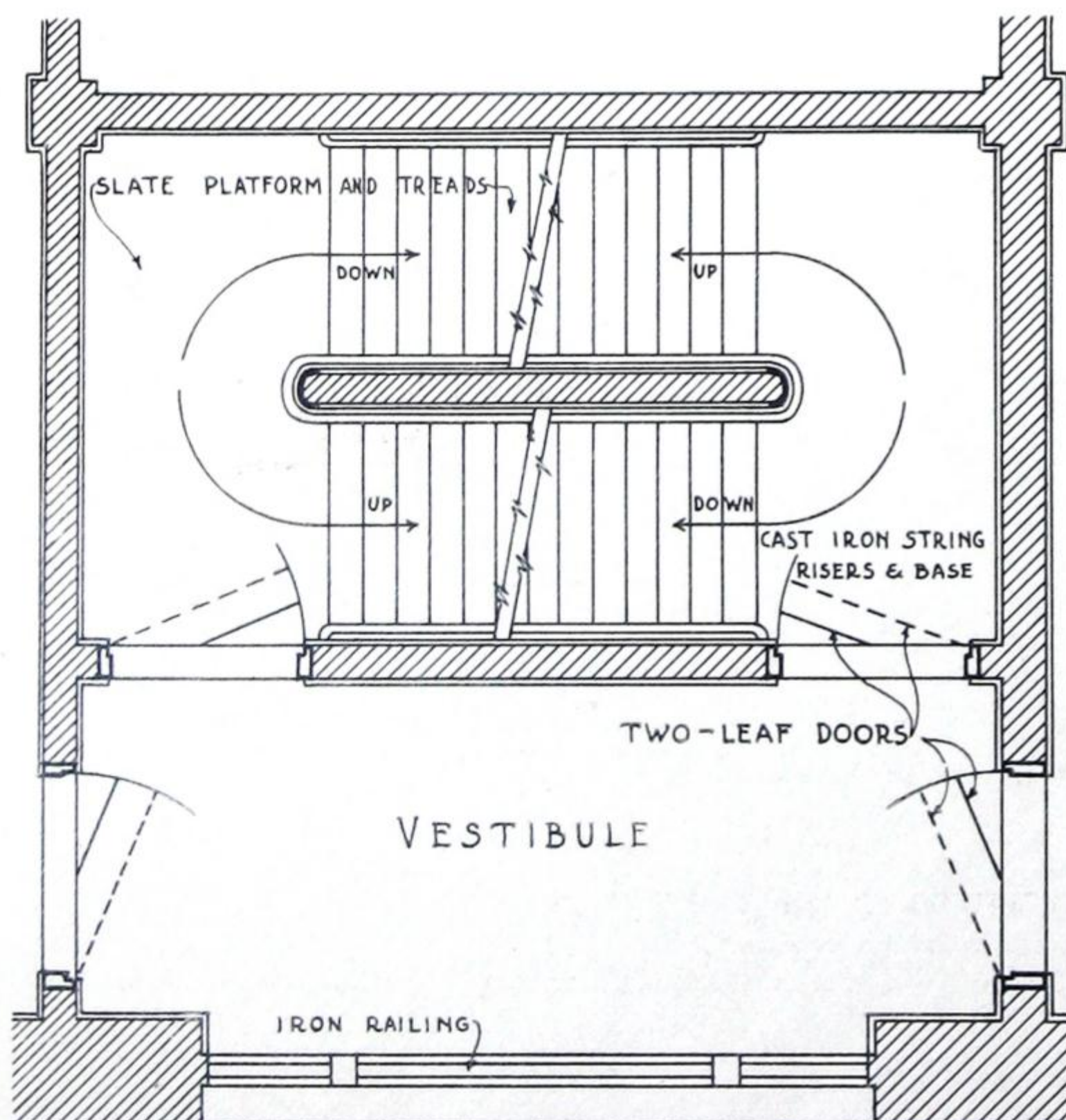


AN UNUSUAL STAIRWAY

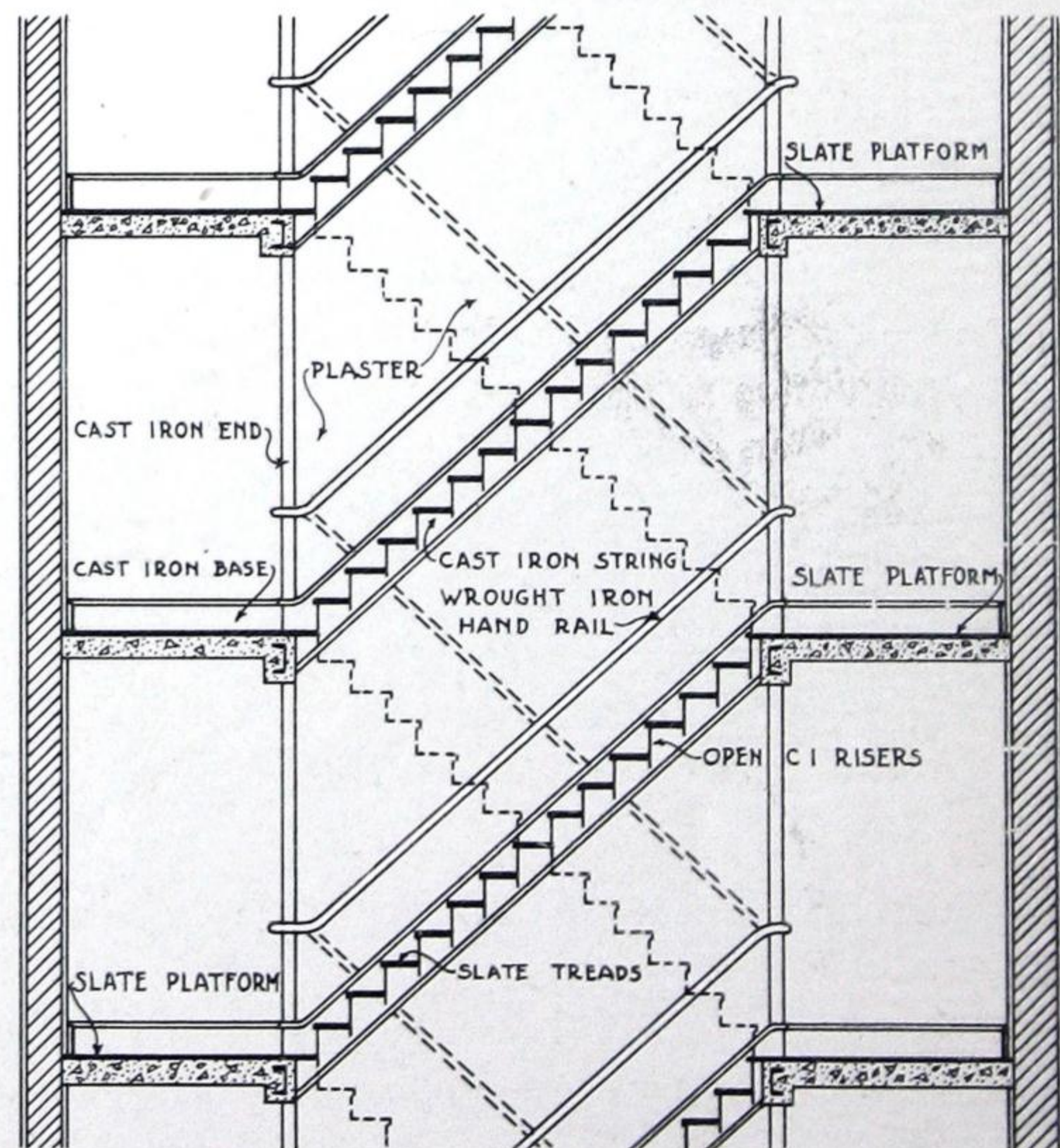
Slate stairs of unusual design and construction are shown by the accompanying illustration and drawings of the stairs in one of the four fire towers of the great Wanamaker Department Store in Philadelphia. This is what is known as a "double stairs" and accomplishes a considerable saving of space in large or high buildings where great exit capacity is a requirement and where the ceilings are of a height sufficient to allow of headroom under the landings at each half flight.

The stairs consist of two complete sets of stairs in the one well, starting down from opposite sides at the same level on each story. This arrangement doubles the capacity and consequently also saves the construction of an additional stair well and the floor space which the second well otherwise would occupy.

This same arrangement of stairs, with the advantages of additional capacity and saving of space, is also used to some extent in schools in large cities where the available ground area is restricted. It is not economical, however, to increase ceiling heights for this purpose only. The lowest ceiling height for which this double stairway is practical is 15' 8", so as to allow headroom between the landings and floors.



PLAN
SCALE IN FEET ~ 0 1 2 3 4



SECTION
SCALE IN FEET ~ 0 1 2 3 4

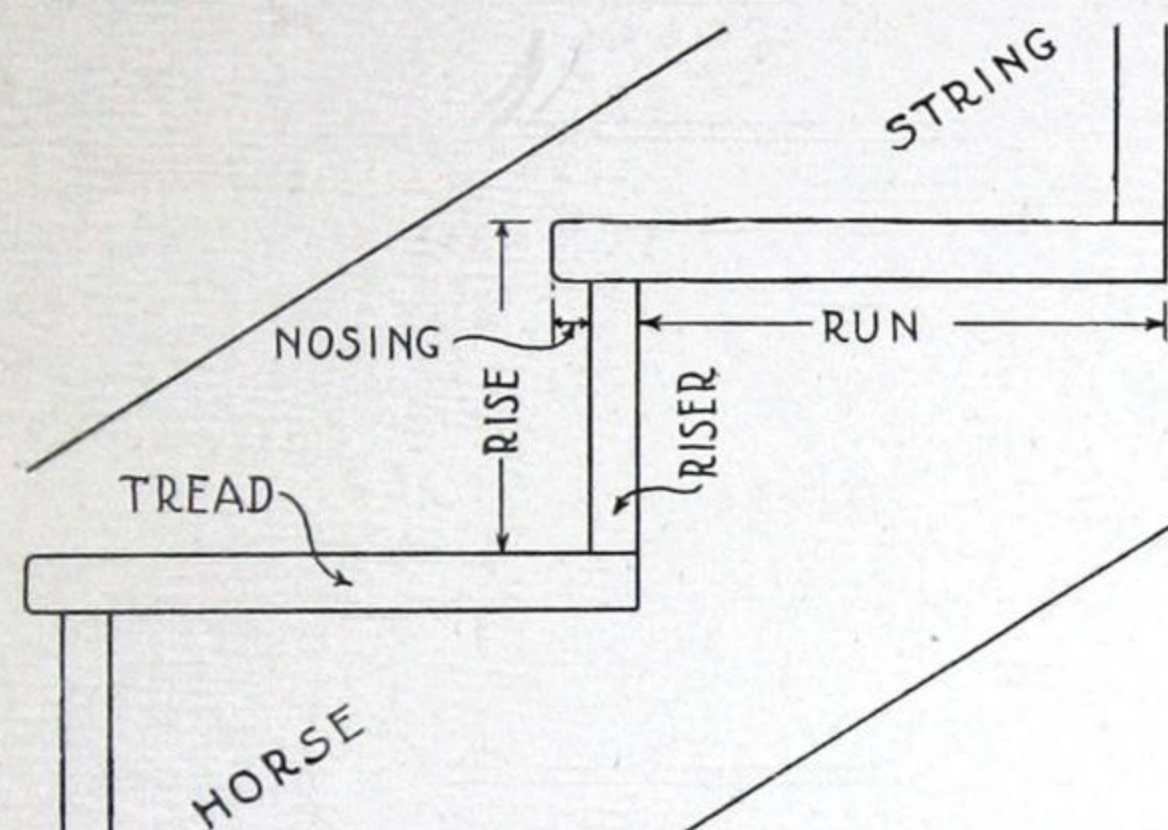
CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

DATA CONCERNING STAIRS

The following information has been gathered from many authoritative sources, and is here presented in a condensed form. It may be considered to represent good practice in localities generally, though of course where specific state or municipal regulations obtain they will naturally take precedence.

RISE AND TREAD

The names of the parts of a step are given in the accompanying illustration. The exact "rise" of any stairs depends upon the height from floor to floor and the number of risers. (See Table of Risers on page 11,



which has been prepared as a draughting room aid and time saver). This rise must, however, bear a certain relation to the tread or width of step. In accordance with established practice, the width of the tread should be increased as the height of the rise decreases, and rules have been carefully developed which may be safely followed in order that the stairs may be comfortably used by the average adult.

There are two of these rules most generally used. According to the first, the sum of the tread and the rise should approximate $17\frac{1}{2}$ ". Thus a fairly comfortable stairs is one of 10" tread by $7\frac{1}{2}$ " rise.

These dimensions are taken on the "carriage," "horse," or on the angles on the "string," as the supports for the stairs are variously termed, and while the rise naturally remains the same, the "nosing" on the tread increases its width by the projection used, which is generally from $\frac{3}{4}$ " to $1\frac{1}{4}$ ".

According to the second and better rule, the sum of two times the rise, plus the tread, should total from 24" to 26". Thus, in the stairs above noted, twice the rise of $7\frac{1}{2}$ " plus the 10" tread equals 25". The relation of tread to riser is also a question of judgment, and varies arbitrarily in special cases. For instance, outside steps to a public building or an interior monumental stairway should always have a wider tread and less rise than ordinarily would be the case.

The following quotation from "Factory Stairs and Stairways," an address by G. L. H. Arnold, published by the American Society of Mechanical Engineers, is of interest:

"In factory practice the tendency is to make the stairs steep in order to save room. Observation by several people over a period of years and under a wide variety of circumstances confirms the opinion that an 8-in. rise by an 8-in. run is the steepest stair practicable for general use and that $7\frac{1}{2}$ -in. rise by 9-in. run is much better. Some building codes prescribe $7\frac{1}{2}$ -in. as the maximum height of rise. Although 7-in. rise by 10-in. run makes probably the easiest of all stairs, the improvement over $7\frac{1}{2}$ -in. by 9-in. is not usually worth the extra floor space consumed."

In any continuous flight of stairs or from floor to floor there should be no change in the height of risers or width of tread, as the walking up and down becomes to a certain extent automatic, and any change would serve to unbalance the person walking and might result dangerously.

In "Stairs and Stairways," one of the "Safe Practices" publications issued by the National Safety Council, appears a table of "Standard Dimensions of Treads and Risers" which is here reproduced with a quotation from the text which precedes it, as follows:

"The tread should provide ample space on which to place the full length of the foot when descending without danger of striking the heel against the riser above; but not so wide as to compel an increased stride. It is good practice to make the tread width (exclusive of nosing overhang), plus twice the riser height, equal to twenty-five inches. In using this rule the thickness of the tread should be added to the height of the riser.

ANGLE OF STAIRWAY WITH HORIZONTAL	28°-27'	29°-25'	30°-25'	31°-26'	32°-28'	33°-32'	34°-37'	35°-44'	36°-52'	38°-02'	39°-12'	40°-25'	41°-38'	42°-53'	44°-09'	45°-26'	46°-44'	48°-04'	49°-24'	50°-00'
RISER - INCHES	$6\frac{1}{2}$	$6\frac{5}{8}$	$6\frac{3}{4}$	$6\frac{7}{8}$	7	$7\frac{1}{8}$	$7\frac{1}{4}$	$7\frac{3}{8}$	$7\frac{1}{2}$	$7\frac{5}{8}$	$7\frac{3}{4}$	$7\frac{7}{8}$	8	$8\frac{1}{8}$	$8\frac{1}{4}$	$8\frac{3}{8}$	$8\frac{1}{2}$	$8\frac{5}{8}$	$8\frac{3}{4}$	$8\frac{13}{16}$
TREAD - INCHES	12	$11\frac{3}{4}$	$11\frac{1}{2}$	$11\frac{1}{4}$	11	$10\frac{3}{4}$	$10\frac{1}{2}$	$10\frac{1}{4}$	10	$9\frac{3}{4}$	$9\frac{1}{2}$	$9\frac{1}{4}$	9	$8\frac{3}{4}$	$8\frac{1}{2}$	$8\frac{1}{4}$	8	$7\frac{3}{4}$	$7\frac{1}{2}$	$7\frac{3}{8}$

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INTERMEDIATE PLATFORMS

It is advisable in some cases and in many is even required by law, that the flights of stairs from floor to floor be broken by the use of platforms or landings. This is particularly necessary in public buildings and places of assembly, factories, warehouses, etc.

The building code of Chicago requires that in buildings used for places of "worship, instruction, and entertainment . . . no stairway shall ascend a greater height than eleven feet without a level landing, which, if its width is in the direction of the run of the stairs, shall not be less than three feet wide, or which, if at a turn of the stairs shall not be of less width than that of the stairs."

In Boston the law states that "there shall be no flights of stairs of more than fifteen or less than three steps between landings." The New York law requires "proper landings at convenient distances." It is never desirable to have only one step at any point, either at landings or at floors, as it always forms a "tripper." Two risers should be the least used and three are better, for the difference in level is thus sure to be instinctively impressed upon the person passing.

WINDERS

The use of winders should be avoided wherever possible, as they are undesirable in all respects and are only permissible in private dwellings and certain other types of buildings. In public, educational and amusement buildings, and in factories, warehouses, office buildings, etc., they should never be used.

The center of travel in any stairs for a single person is from 18 to 20 inches from the handrail. Where it is necessary to use winders they should be worked out so that the width, at this distance from the narrow edge is sufficient for ease of walking and approximates in width the other treads on the straight runs. The best arrangement of winders is to divide a ninety degree arc between the risers at the angle into three equal parts. One winder should never be used, as this also is a tripper.

STRENGTH OF STAIRS

In the majority of cities the building regulations give the necessary loads for which stairs must be calculated, particularly for larger buildings. In the absence of such regulations a load based on 150 pounds per square foot, may be used, although some codes permit 100.

This load has been developed by experiments which show that a densely packed crowd in a flat space weighs between 140 and 150 pounds per square foot. It is not probable that such a load could ever be found upon a stairway, but as the load on a stairs is movable, causing a certain amount of vibration, the highest figure is usually taken as being none too much for safety.

In making calculations this load should be taken over the area represented by the horizontal plane of the stairs. The stringers or horses must of course be calculated by the total span or length for the full inclined distance between supports. These are then figured for strength based upon the total load for the stairs as before determined.

CAPACITIES AND WIDTHS

The greatest problems in stair widths in relation to the capacities of buildings occur in schools, theatres, department stores and industrial buildings. In public buildings usually monumental in character, the problem is not so pronounced, as the spaciousness generally permits of a stairway of ample size for the number of people likely to use it.

The Committee on Building Construction, formerly known as the Committee on Fire-Resistive Construction, of the National Fire Protection Association, has recommended certain standards for stairway construction, including enclosures. This data may be ascertained in detail from the "Specifications for Construction of a Standard Building" and other "Specifications" contained in the published reports and proceedings.

The Committee on Safety to Life of the same National organization has made exhaustive studies and many recommendations for design and detail of stairways and other exits which may be studied in the publications of the N. F. P. A.

TABLE OF RISERS AND SOME MEASUREMENTS

TABLE OF RISERS GIVING HEIGHT OF RISERS IN INCHES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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	8'-0"	8'-1"	8'-2"	8'-3"	8'-4"	8'-5"	8'-6"	8'-7"	8'-8"	8'-9"	8'-10"	8'-11"	9'-0"	9'-1"	9'-2"	9'-3"	9'-4"	9'-5"	9'-6"	9'-7"	9'-8"	9'-9"	9'-10"	9'-11"	10'-0"	10'-1"	10'-2"	10'-3"	10'-4"	10'-5"	10'-6"	10'-7"		10'-8"	10'-9"	10'-10"	10'-11"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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TABLE PREPARED BY THE STRUCTURAL SERVICE BUREAU, N.W. COR. 17th & WALNUT STS., PHILADELPHIA, PENNA.

MEASUREMENTS OF SOME RISERS AND TREADS

BUILDING	RISE	RUN	LOCATION	BUILDING	RISE	RUN	LOCATION
RAILWAY STATIONS				HOTELS			
Penna. Station, N. Y.	6	16 3/4	Concourse to Street	Vendig, Phila.	7 1/2	10 1/2	Lobby to Second
	6	14 1/2	Concourse to Street	Ritz Carlton, Phila.	6 1/2	12 3/4	Lobby to Second
	6 3/4	13 1/2	Concourse to lower level	Pennsylvania, New York	6 1/4	12	Lobby to Second
	7	10 3/4	Lower level to track		6 1/2	12	Lobby to Basement
Grand Central, N. Y.	6	12	Concourse to Street	Biltmore, New York	6 1/2	12	Street to Lobby
	6	12	Concourse to lower level	Commodore, New York	6 1/8	12 1/4	Street to Lobby
Broad St. Station, Phila.	6 1/2	14 1/4	Interior to Concourse	INDUSTRIAL			
	6 1/4	14 1/4	Street to Concourse	Baldwin Loco. W'ks, Phila.	7 1/2	10 1/2	First to Second
Reading Terminal, Phila.	6	12	Interior to Concourse	Belber Co. B'l'd'g, Phila.	7 1/2	10	First to Second
	6 1/4	15	Street to Concourse	Dill & Collins B'l'd'g, Phila.	8	11	First to Second
Wilmington, Del.	6 1/2	13	Street to Train Floor	G. A. Bisler Co., Phila.	7 1/4	11 1/2	First to Second
THEATRES				England-Walton, Phila.	7 1/2	10	Second to Third
B. F. Keiths, Phila.	7 1/2	10 1/2	Lobby to Balcony	DEPARTMENT STORES			
Lyric, Phila.	7 1/2	10 3/4	Lobby to Balcony	Wanamakers, Phila.	6 1/2	11	Second to Third (Main)
Garrick, Phila.	7 1/4	10 1/2	Orchestra to Balcony	Snellenburgs, Phila.	Old 6 1/2	11 1/4	First to Second (Main)
Globe, Phila.	7 1/4	10 1/4	Orchestra to Balcony		New 7	10 3/4	
Hudson, New York	7 1/4	10 5/8	Street to Balcony	Gimbels, Phila.	7	11	Second to Third (Main)
	7 3/4	10 1/2	Street to Basement	OFFICE BUILDINGS			
Keiths Broadway, N. Y.	7 1/4	10 5/8	Street to Balcony	Otis Building, Phila.	8 1/2	9 1/2	First to Second
	8 1/2	12	Outside Metal Stairs	Am. Baptist Pub. Society	8	10	First to Second
SUBWAYS				Widener B'l'd'g, Phila.	7	11	Twelfth to Thirteenth
Times Square, New York	6 3/4	10 3/4		Penna. B'l'd'g, Phila.	7 1/2	10	First to Second
Brooklyn Bridge, N. Y.	7 1/2	10		Harrison B'l'd'g, Phila.	7	10 1/2	First to Second
15th & Market St., Phila.	7	10 1/2		Bulletin B'l'd'g, Phila.	6 7/8	11	First to Second
8th & Market St., Phila.	7 1/4	10		Real Estate Trust, Phila.	7 1/2	9 3/4	Third to Fourth
APARTMENTS				Emerg. Fleet B'l'd'g, Phila.	7 1/4	9 3/4	First to Second
Wellington, Phila.	7 1/2	11 1/8	First to Second	Y. M. C. A.			
Latham, Phila.	7 1/2	9	First to Second	Central, Phila.	6 1/2	10 3/4	Fourth to Fifth
Coronado, Phila.	7 1/2	12 5/8	Upper Flights				
	7 1/2	10 5/8	First to Second				

CHAPTER 3 OF A SERIES ON STRUCTURAL SLATE

SOME BUILDINGS IN WHICH SLATE STAIRS HAVE BEEN INSTALLED

Adelphi Theatre	Philadelphia	Mass. General Administration Building	Boston
John T. Windrim, Architect		Coolidge & Shattuck, Architects	Norcross Brothers, Contractors
Otis Building.....	Philadelphia	Commonwealth Armory	Boston
McIlvane & Roberts, Architects	Metzger & Fisher, Contractors	James E. McLaughlin, Architect	
Wanamaker Department Store.....	Philadelphia	Harvey Building.....	Boston
D. H. Burnham Co., Architects		George W. Harvey Co., Architect and Contractor	
Arcadia Theater	Philadelphia	Textile Building	Boston
Henan and Boyle, Architects		George W. Harvey Co., Architect and Contractor	
Catholic Girls' High School	Philadelphia	Our Lady of Lourdes School.....	Boston
Ballinger & Perrot, Architects		Maginnis and Walsh, Architect	Chas. Logue Bldg. Co. Cont'r
England and Walton Factory.....	Philadelphia	Newton Trust Company.....	Newton, Mass.
D. Knickerbacker Boyd, Architect	Wm. Steele & Son Co., Cont'r	Kendall Taylor Co., Architect	John A. Duff, Contractor
Architects' Building.....	New York	Arlington High School	Arlington, Mass.
Post and McCord, Architects		H. B. S. Prescott, Architect	
Pratt Residence.....	New York	Arlington Junior High School.....	Arlington, Mass.
Delano and Aldrich, Architects		H. B. S. Prescott, Architect	W. W. Ryan, Contractor
Coe Residence.....	New York	Amesbury High School	Amesbury, Mass.
Walker and Gillette, Architects		H. B. S. Prescott, Architect	Kennedy & Peterson, Contractors
N. Y. Hippodrome	New York	North Attleboro High School.....	North Attleboro, Mass.
Fred Thompson, Architect		H. B. S. Prescott, Architect	James A. Munroe, Contractor
Woolworth Building	New York	General Fire Extinguisher Building.....	Providence, R. I.
Cass Gilbert, Architect		Jackson, Robertson and Adams, Architects	
Bowling Green Building.....	New York	Counting House Corp. Building.....	Providence, R. I.
Ludlow and Peabody, Architects		Jackson, Robertson and Adams, Architects	
U. S. Post Office (Main Office).....	New York	Quincy Point School	Quincy, Mass.
McKim, Mead & White, Architects		Kennedy and Peterson, Contractors	
Sperry Gyroscope Co.....	New York	Norfolk Downs School.....	Quincy, Mass.
Helmle and Corbett, Architects		Kennedy and Peterson, Contractors	
Mass. General Service Building.....	Boston	Foxboro State Hospital	Foxboro, Mass.
Coolidge & Shattuck, Architects	George A. Fuller, Contractor	James E. McLaughlin, Architect	James A. Munroe, Contractor
Kresge Building.....	Boston	St. Patrick's School.....	Fall River, Mass.
Newhall and Blevins, Architects	George A. Fuller, Contractor	Maginnis & Walsh, Architects	Chas. Logue Bldg. Co., Cont'r

If any specifiers or users of slate have data which they feel will be of value to others interested, either from the standpoint of the production or of the use of this material, The Structural Slate Company requests them to submit such data for analysis by it and the Structural Service Bureau.

The Company trusts that the suggestions as well as the specifications and notes contained in these Chapters, together with any modifications that may be made by individual architects or others, will result in the most advantageous use of Structural Slate from the standpoint of the architect and the industry, as well as of the owners and occupants of all buildings where slate may be put to any of its diversified uses.

Address all inquiries or requests for additional copies of this or other Chapters to



The Structural Slate Company
Pen Argyl, Pennsylvania